

AMENDMENTS TO THE SPECIFICATION

Please replace the title, "TRANSDUCING HEAD DESIGN WITH LOW ERASURE FIELD" at page 1, line 1, with --TRANSDUCING HEAD INCLUDING A MAGNETIC ELEMENT EXHIBITING VARYING PERMEABILITY--.

Please replace the paragraph at page 6, lines 20 through page 7, lines 5, so the paragraph reads as follows;

FIG. 1 is a top view of typical disc drive system 10 employing a transducing head having a perpendicular writer and reader portion. Disc drive system 10 includes magnetic medium 12 mounted for rotational movement about an axis defined by spindle 14 within housing 16. Disc drive system 10 also includes actuator 18 mounted to base plate 20 of housing 16, with actuator 18 being pivotally movable relative to disc ~~[[14]]~~ 12 about axis 22. Cover 24 covers a portion of actuator 18. Drive controller 26 is coupled to actuator 18. Drive controller 26 is either mountable within disc drive system 10 or is located outside of disc drive system 10 with suitable connection to actuator 18. Actuator 18 includes e-block assembly 28, actuator arm 30 and head suspension assembly 32. Head suspension assembly 32 includes load beam 34 coupled to actuator arm 30 and air bearing slider 36 coupled to load beam 34 by a flexure. Slider 36 carries a transducing head, which has a reader portion, such as an MR head, for reading information from disc 12 and a perpendicular writer for encoding data on disc 12.

Please replace the paragraph at page 7, line 19 through page 8, line 7 so the paragraph reads as follows:

Writer portion 102 of transducing head 100 comprises main pole 108, back via 110, return pole 112, conductive coil layers 114, and write gap 116. Main pole 108, back via 110, and return pole 112 are formed of magnetic material. Conductive coil layers 114 are formed of one or more conductive coil layers encapsulated by insulating layers (not shown). The insulating layers function to electrically insulate conductive coil layers 114 from main and return poles ~~[[104]]~~ 108

and ~~[[108]]~~ 112. Conductive coil layers 114 wrap around back via 110. However, the configuration of conductive coil layers 114 is not essential for the present invention. Any coil configuration effective for the purpose of producing a time-varying electrical current may be used in combination with the present invention. Main pole 108 and return pole 112 are separated from each other at an air bearing surface (ABS) of transducing head 100 by a write gap 116 and are connected to each other at a region away from the ABS by back via 110. The ABS of transducing head 100 is the surface immediately adjacent magnetic medium 106. Back via 110 functions to magnetically couple main pole 108 and return pole 112. Trailing edge 118 of return pole 112 is the edge of return pole 112 closest to main pole 108. Leading edge 120 of return pole 112 is the edge furthest from main pole 108.

Please replace the paragraph at page 9, lines 9-26 so the paragraph reads as follows:

MR sensor ~~[[120]]~~ 128 is a multilayer device operable to sense magnetic fields from magnetic medium 106. MR sensor ~~[[120]]~~ 128 may be any one of a plurality of MR-type sensors, including, but not limited to, AMR (anisotropic magnetoresistive), GMR (giant magnetoresistive), and TMR (tunnel magnetoresistive). At least one layer of MR sensor ~~[[120]]~~ 128 is a sensing layer, such as a free layer of a GMR spin valve sensor, that requires longitudinal biasing. Top and bottom reader shields 124 and 126 are formed of magnetic material, and may be formed of the same materials as return pole 112, but it is not necessary to the operation of transducing head 100. Thus, top and bottom reader shields 124 and 126 may be formed of magnetic material such that permeability of top and bottom reader shields 124 and 126 increases from trailing edge 134 and 138 to leading edge 136 and 140, respectively. Arrows drawn on top and bottom reader shields 124 and 126 show the direction permeability (designated as μ) increases. In an alternate embodiment, top and bottom reader shields 124 and 126 may be formed of Permalloy. Insulating layers 130 are formed of nonmagnetic material and function to magnetically insulate MR sensor 128 from top and bottom reader shields 124 and 126. Gap layer 132 is formed of nonmagnetic material and functions to separate top and bottom shields 124 and 126.

Please replace the following paragraph at page 14, lines 23-26 so the paragraph reads as follows:

Reader portion 204 comprises top and bottom reader shields 222 and 224, MR sensor 226, insulating layer 228, and gap layer 230. Top and bottom reader shields ~~[[224]] 222~~ and ~~[[226]] 224~~ may be single layers or may be formed of the same three layers as return pole 210 in order to minimize any potential side-writing problems.

Please replace the following paragraph at page 14 lines 27 through page 15, lines 16 so the paragraph reads as follows:

The write process for transducing head 200 is similar to the one described with respect to transducing head 100 in FIG. 2. A magnetic field flowing through main pole 206 will complete its magnetic flux path using return pole 210. With the return pole configuration shown in FIG. 3, the magnetic field will complete its path using the thickness of return pole 210, rather than just a trailing edge of return pole 210, because the magnetic field will complete a flux path using a path having the least resistance. The magnetic field will first begin its return path through first layer 214, but then will spread out and flow through second and third layers 216 and 218 because second and third layers 216 and 218 have higher permeability and lower resistance to the magnetic field. Thus, a magnetic field will not concentrate at the trailing edge of return pole 210 and a peak magnetic field flowing through return pole 210 will not be of sufficient value to overcome an coercive force of a magnetic medium, and side-writing will be reduced. If reader shields ~~[[224]] 222~~ and ~~[[226]] 224~~ also have multiple layers like return pole 210, they will minimize side-writing caused by reader shields ~~[[224]] 222~~ and ~~[[226]] 224~~ in a similar way. That is, a magnetic field will not concentrate at a trailing edge of top or bottom reader shield~~[[s]]~~ ~~[[224]] 222~~ or ~~[[226]] 224~~ because stray magnetic fields will complete its flux path using the thickness of the top or bottom reader shields.